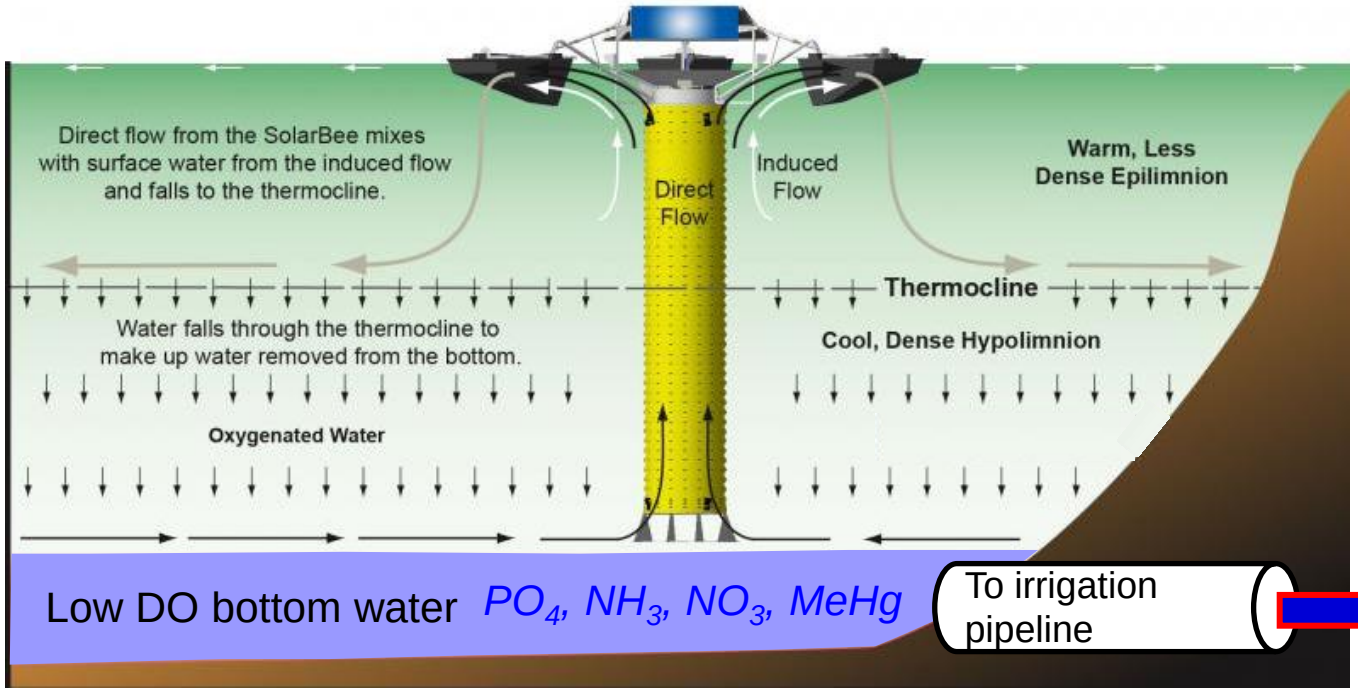
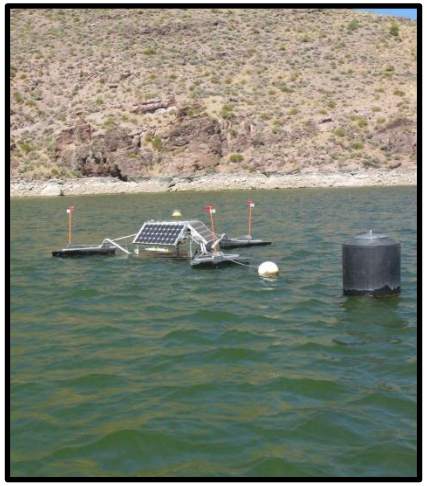
Using thermocline manipulation to remediate a reservoir with elevated mercury: Final report

UT Mercury workgroup meeting
March 2014

Utah Department of
Environmental Quality

Hg REMOVAL PROJECT





Modified from SolarBee, Inc.

- **Project goal: Interrupt the Hg methylation cycle**
- **Reverse water flow (bottom → up)**
- **Oxygenate bottom water and near-surface sediments**
- **Photodegrade MeHg**

POST-INSTALL TIMELINE

Pump installed

Reservoir monitoring: T, DOC, chl-a, nutrients, field param.

Mercury monitoring: water, sediment, algae

JUL 2011

OCT 2012

AUV/QW mapping

Fish tissue

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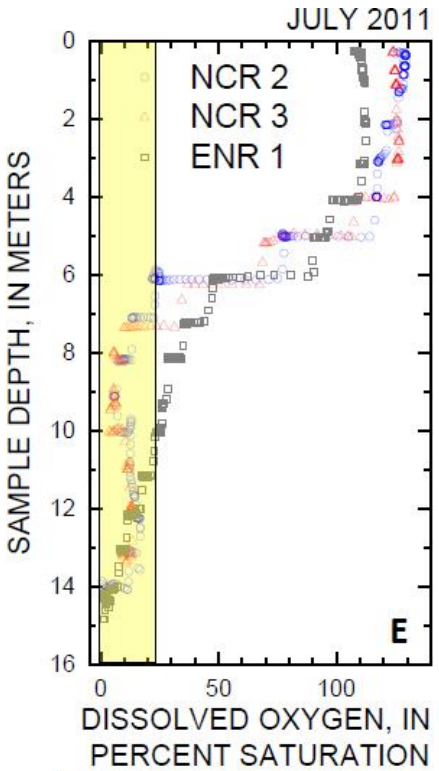
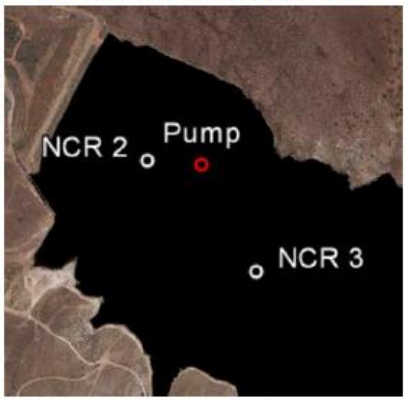
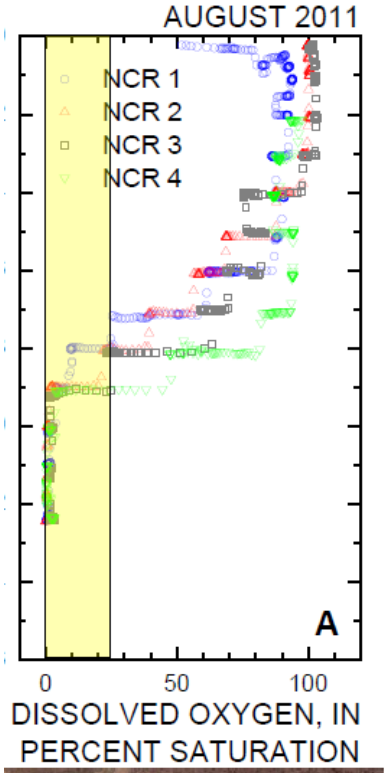
SUBOXIC ZONE DECREASE

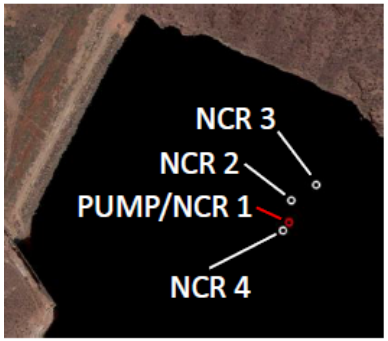


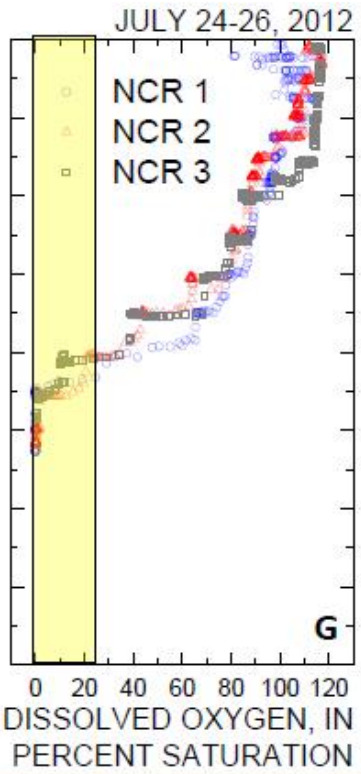


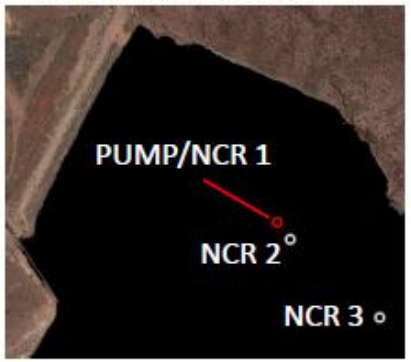
Pre-pumping

Pumping









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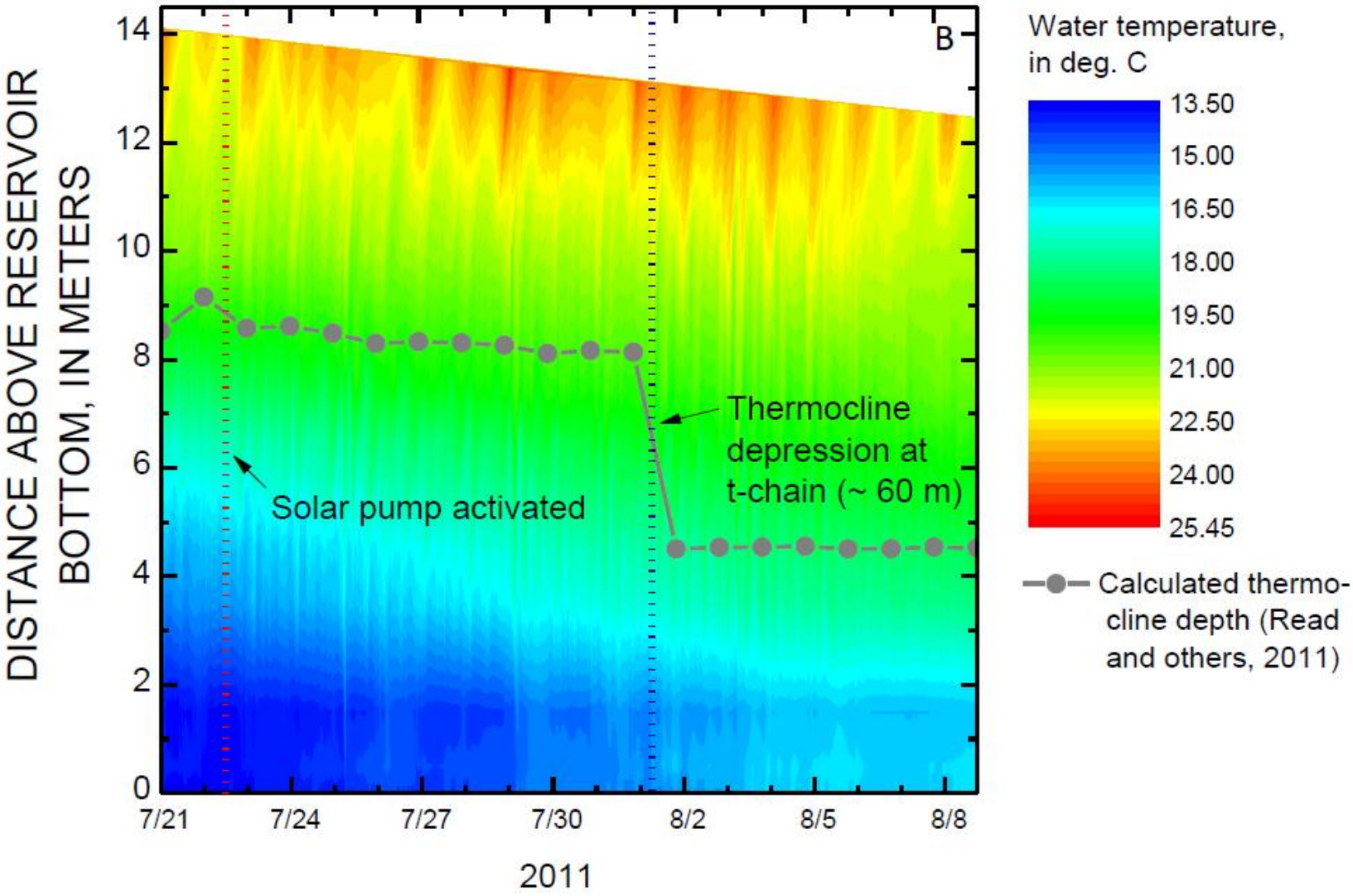
THERMOCLINE DEPRESSED



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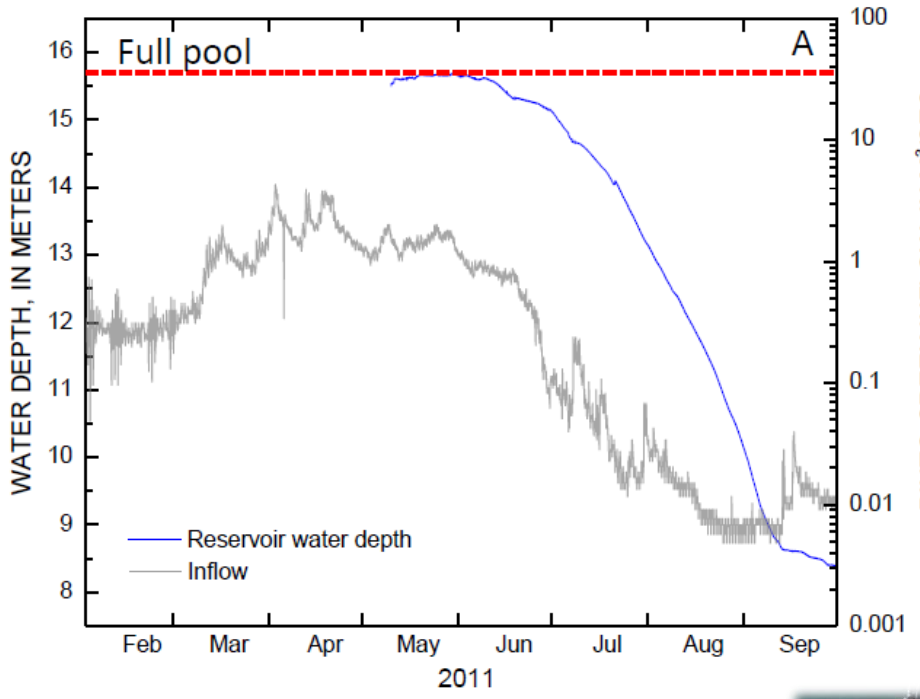
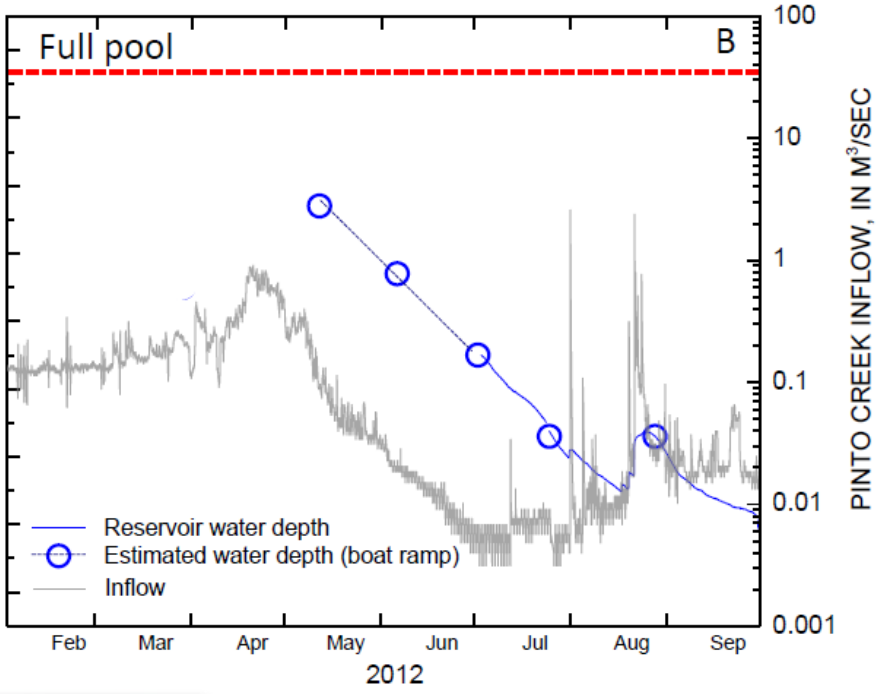
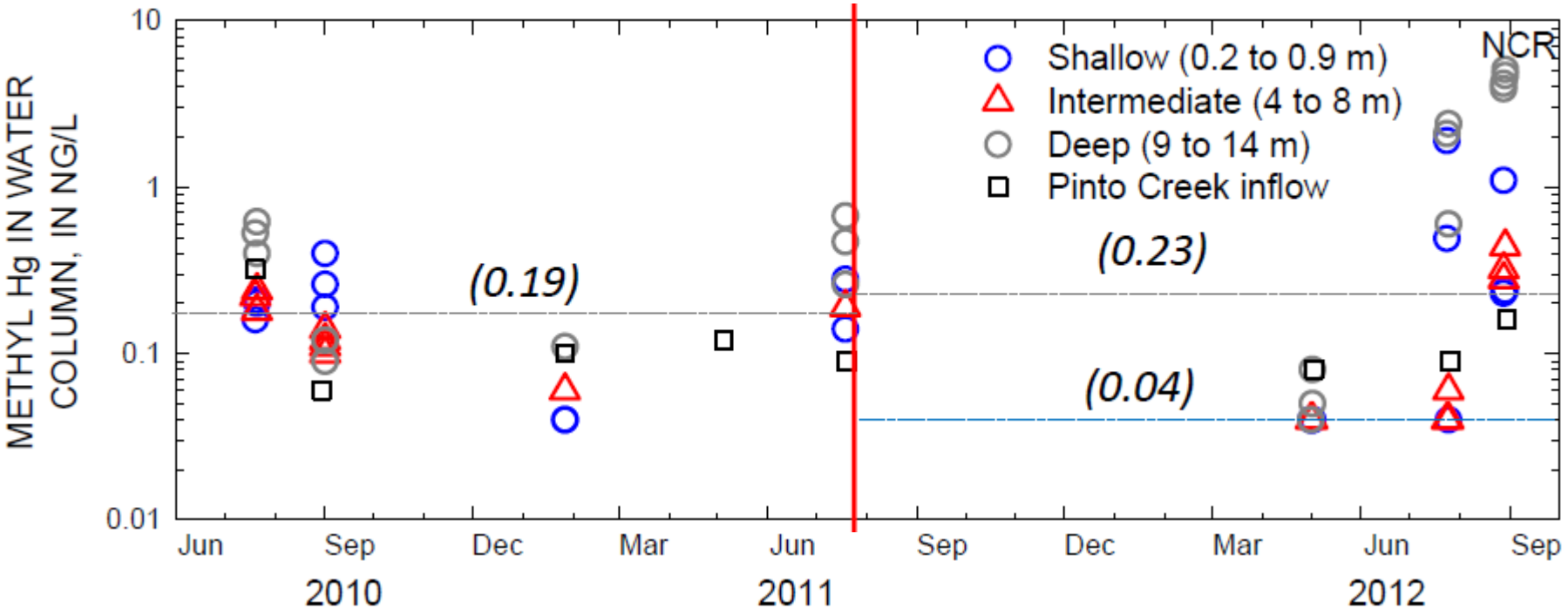
THE FLOOD OF 2012



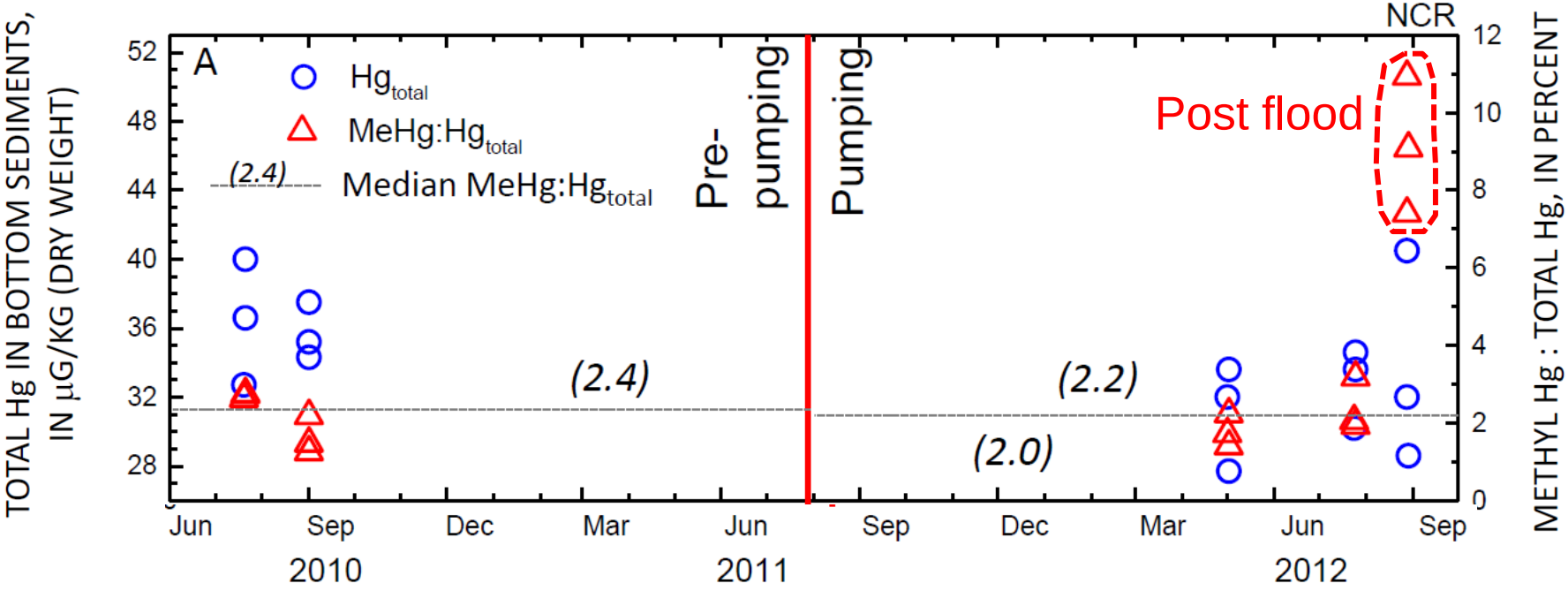


FLOOD: MeHg IN WATER



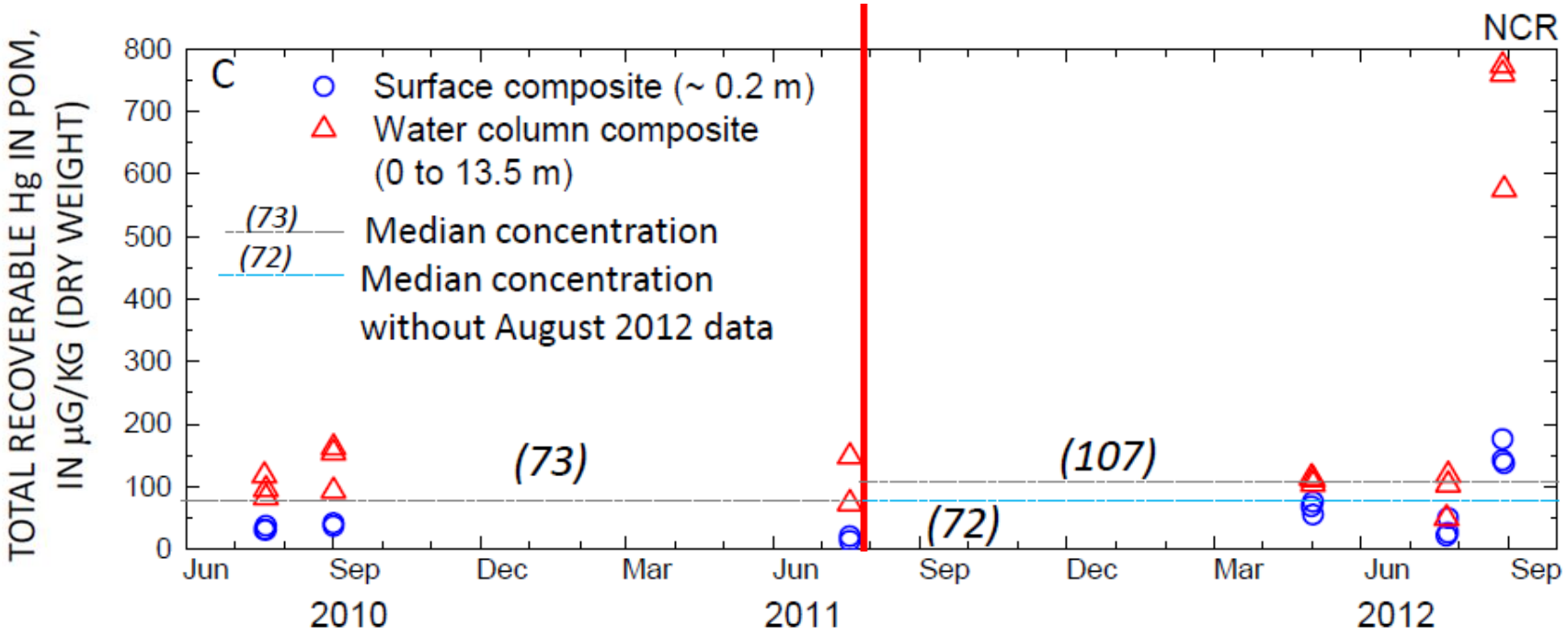
- **Highest MeHg levels in bottom waters measured after flood event (3.9 to 5.1 ng/L)**
- **Median MeHg in surface waters = 0.11 ng/L (n = 337) (Scudder and others, 2009)**

FLOOD: MeHg IN SEDS



- **Post flood MeHg:Total Hg ranged from 7.4 to 10.9%**
- **Median MeHg:Total Hg in sediments = 1.6% (n = 337) (Scudder and others, 2009)**

FLOOD: Hg IN POM



- **POM = analog for particulate uptake in lower trophic levels**
- **Post-flood $[Hg]_{POM}$ increased by ~ 7 X over $[median]_{pumping}$**

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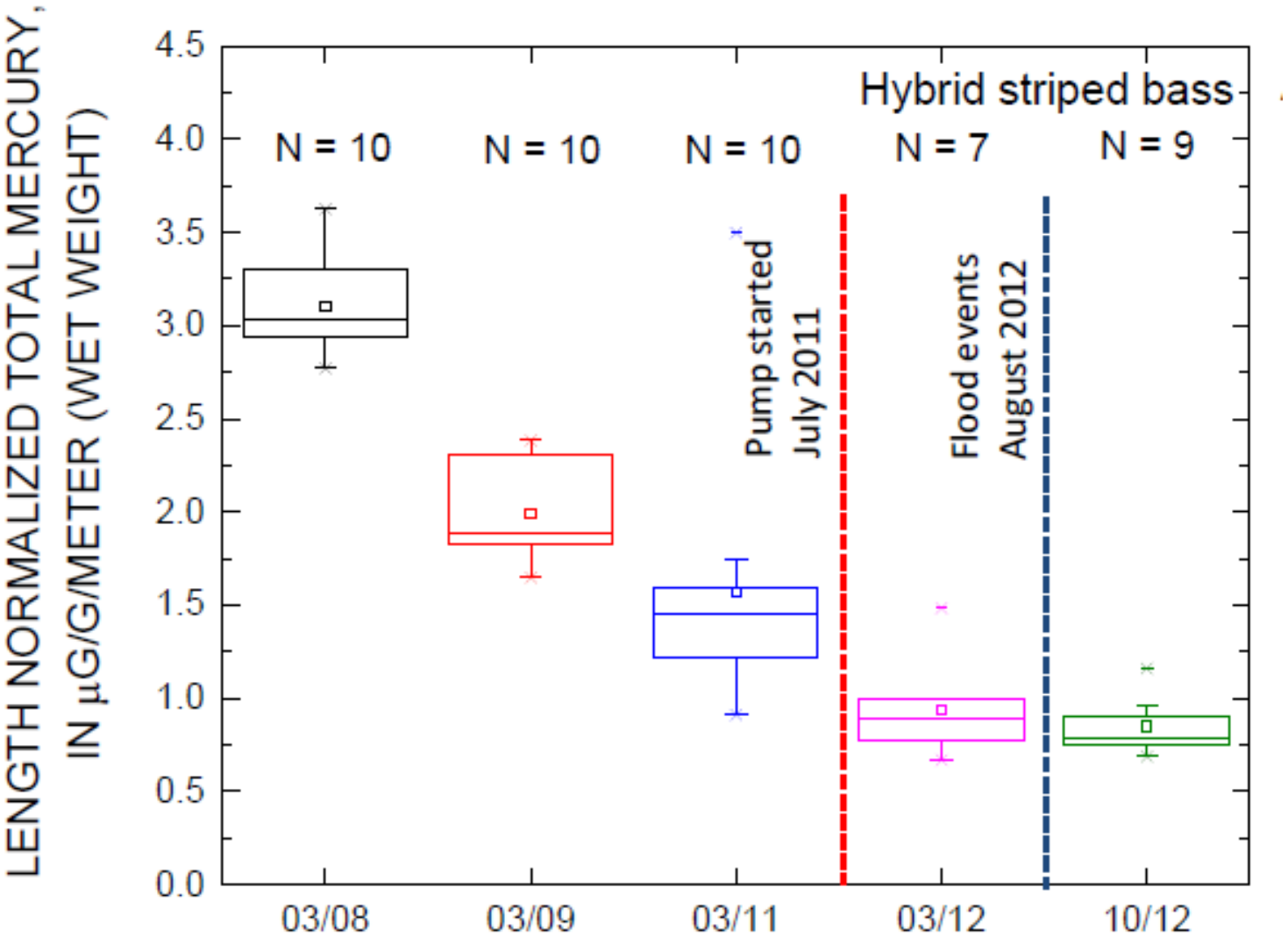
FLOOD: Hg WIPER



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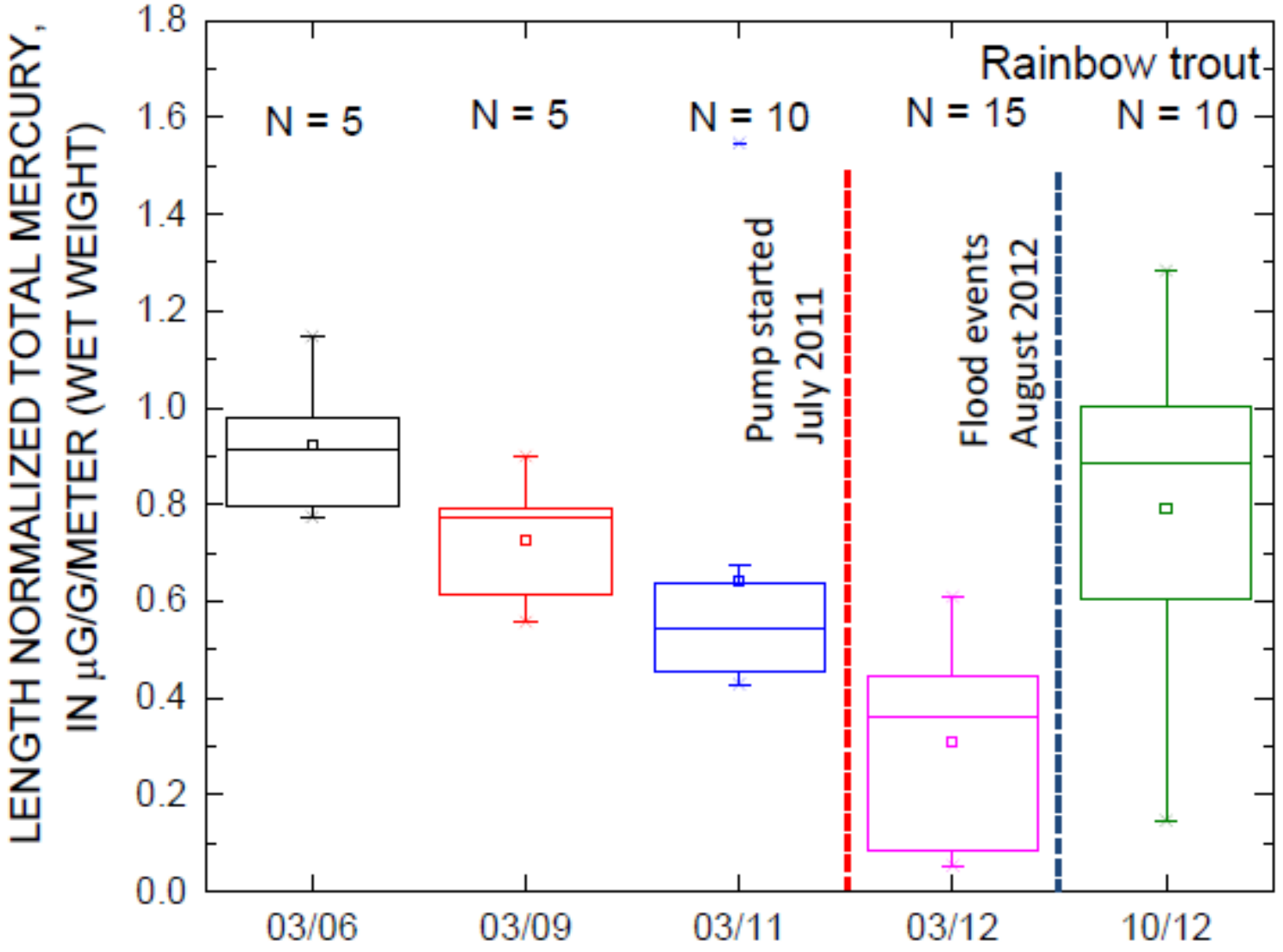
FLOOD: Hg TROUT



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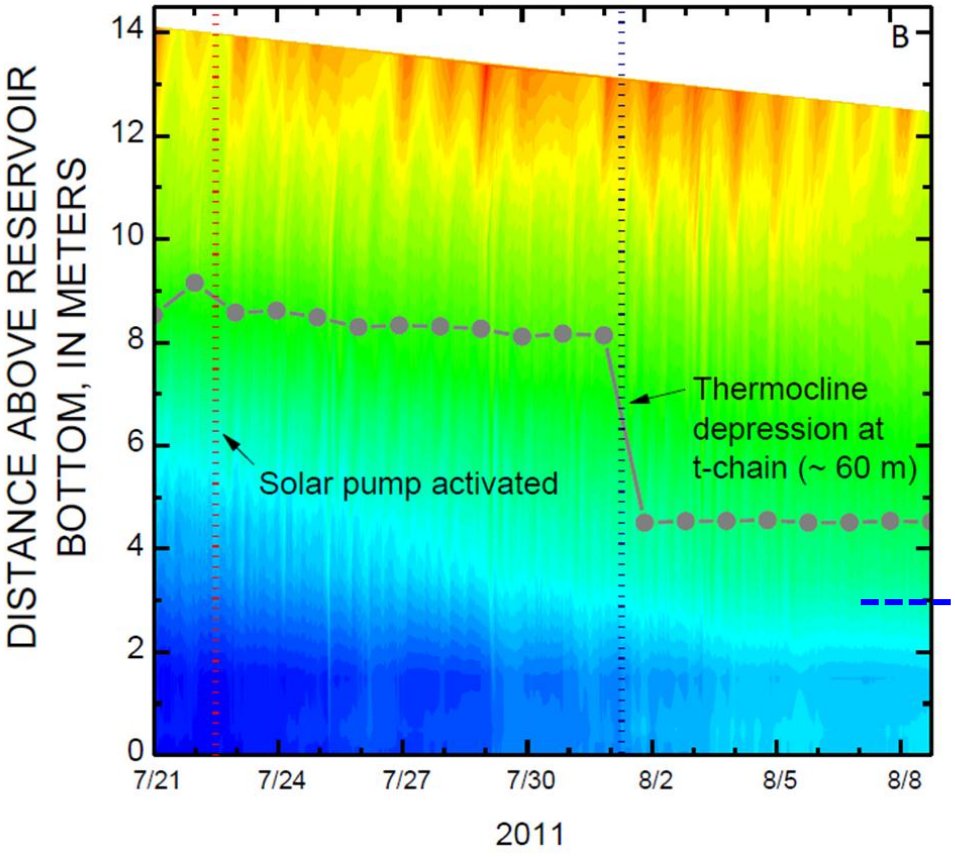
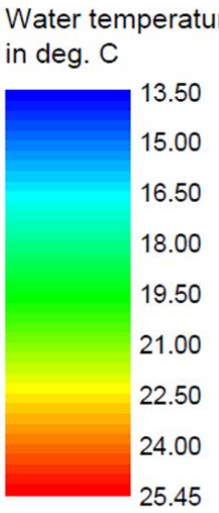
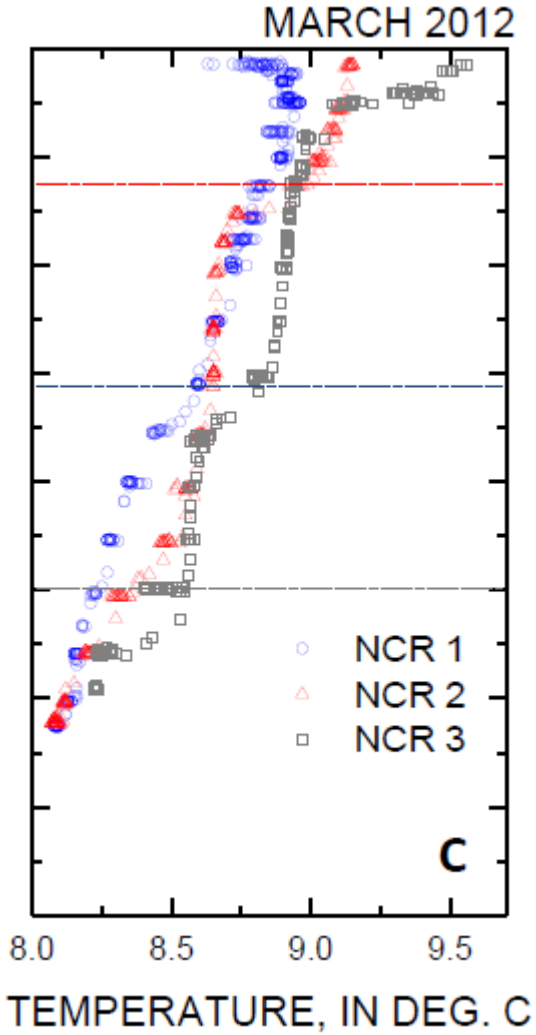
Hg TROUT





Trout habitat (lower 3 m)



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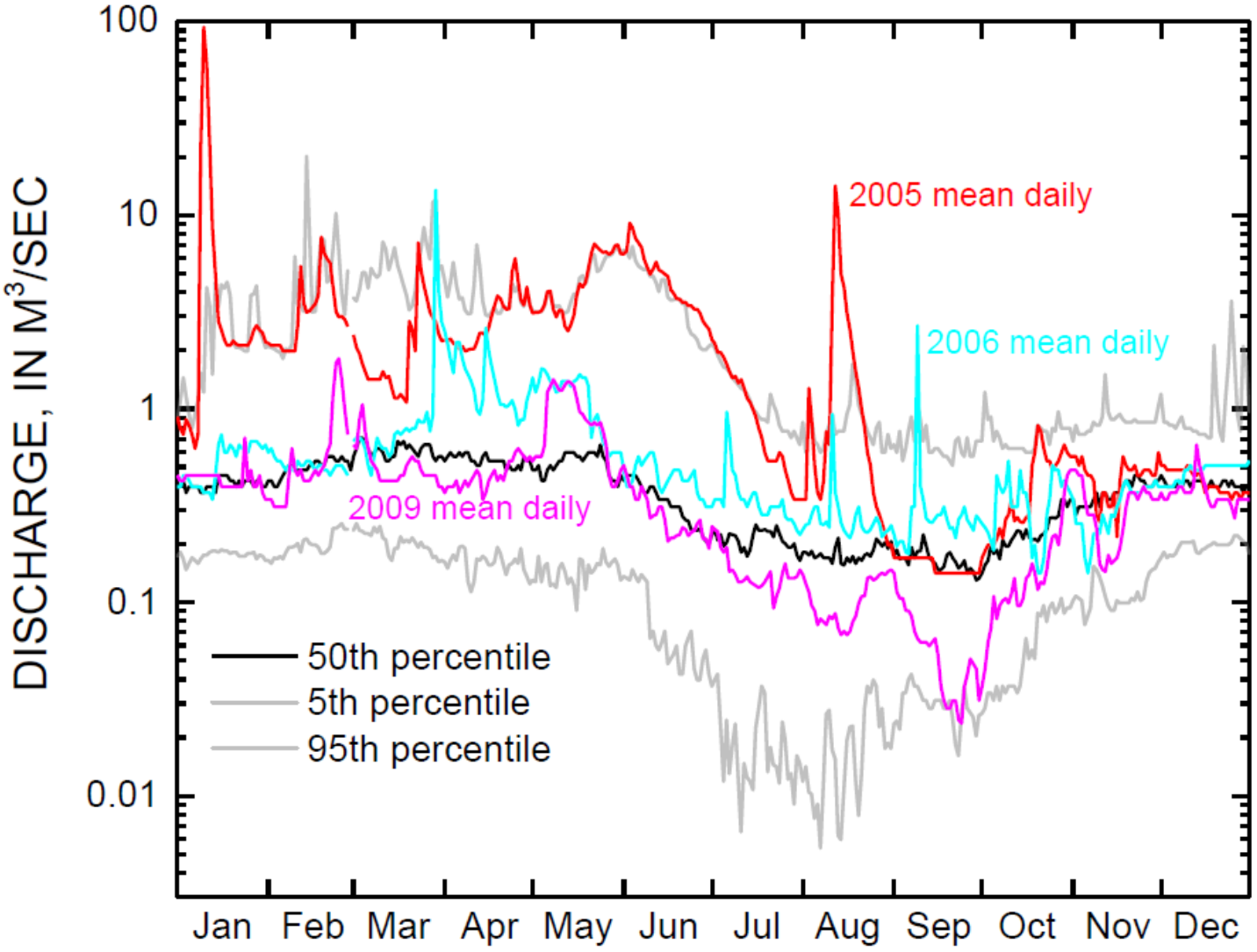
PREVIOUS EVENTS



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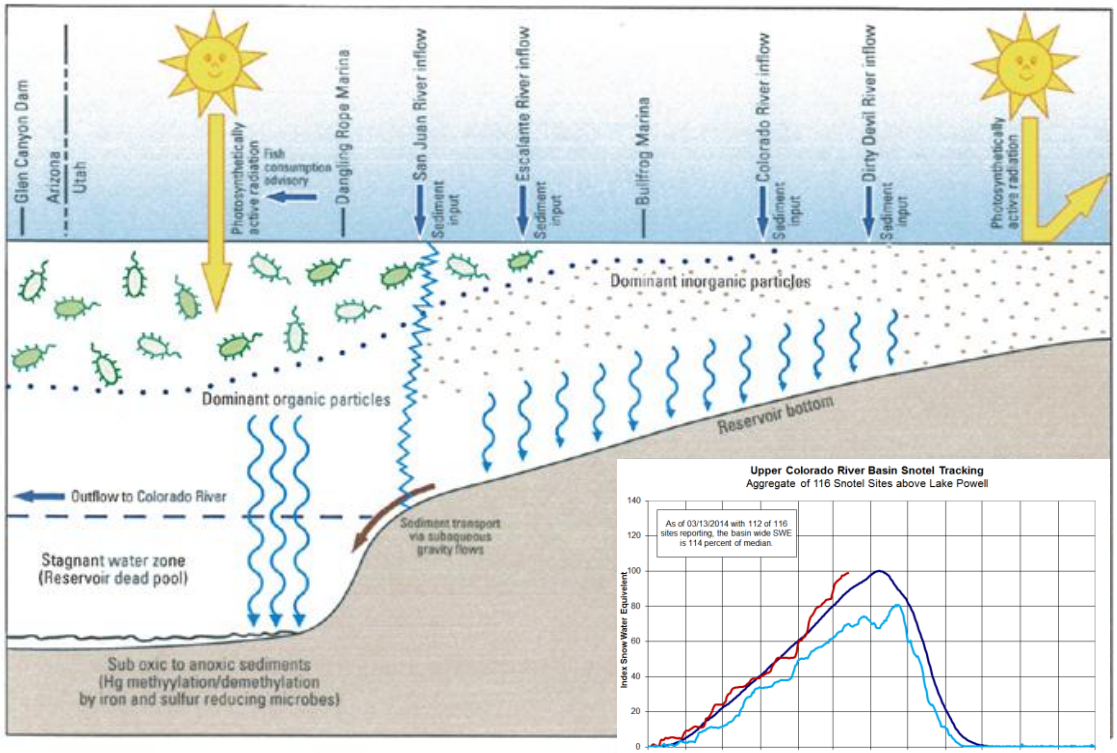
NEXT STEP: LAKE POWELL



- 12-day synoptic cruise
- May 29 – June 9 (high flow)
- 24 sample sites
- Methylation rates in sediments
- Continuous Hg in air/sw

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FINAL REPORT

ELEMENTA
Science of the Anthropocene

UTAH DNR
WILDLIFE RESOURCES

Utah Department of Environmental Quality

Using thermocline manipulation to remediate a reservoir with elevated mercury: Physical and biogeochemical results

--Manuscript Draft--

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